

From Planning the Port/City to Planning the Port-City

Exploring the Economic Interface in European Port Cities

Van den Berghe, Karel*¹ & Daamen, Tom*

*Delft University of Technology, Department of Management in the Built Environment, Julianalaan 134 2628BL Delft, The Netherlands

In last three decades, planning agencies of most ports have institutionally evolved into a (semi-) independent port authority. The rationale behind this process is that port authorities are able to react more quickly to changing logistical and spatial preferences of maritime firms, hence increasing the competitiveness of ports. Although these dedicated port authorities have proven to be largely successful, new economic, social, and environmental challenges are quickly catching up on these port governance models, and particularly leads to (spatial) policy ‘conflicts’ between port and city. This chapter starts by assessing this conflict and argue that the conflict is partly a result of dominant—often also academic—spatial representations of the port city as two separate entities. To escape this divisive conception of contemporary port cities, this chapter presents a relational visualisation method that is able to analyse the economic interface between port and city. Based on our results, we reflect back on our proposition and argue that the core challenge today for researchers and policy makers is acknowledging the bias of port/city, being arguably a self-fulfilling prophecy. Hence, we turn the idea of (planning the) port/city conflicts into planning the port-city’s strengths and weaknesses.

1 Introduction

Increasingly, the landlord role of port authorities (PAs) is being challenged (van der Lugt, de Langen, & Hagdom, 2015). As a landlord, the main task of a PA is the basic development and management of its port area. Part of latter is to make (new) land ready for leasing, for example, by making sure that quays, locks and docks meet the requirements (e.g. deep water access) of the maritime firms wanting to rent and use the land (Verhoeven, 2010). During last two to three decades, this ability to adapt their infrastructure and port area to the changing requirements of maritime firms became the prime way to remain competitive and, as such, performative (van der Lugt, Doms, & Parola, 2013). However, it became clear that this ability required a change of the traditional institutional structure of PAs (Verhoeven, 2010). Port affairs used to be one of the many administrative tasks of urban governments or even, in some cases, the responsibility of the mayor-entrepreneur. However, during the second half of the 20th century the maritime industry, as with so many industries, became increasingly global, corporate and was scaling up, vertically and horizontally. Consequently, the available time to implement the required infrastructure changes became too short for the traditional democratic policy process of urban governments, eventually thus, influencing the competitive level of the port itself (van der Lugt et al., 2013).

To increase the speed of decision-making in this competitive environment, during last two decades, most PAs became (semi-)independent organizations with a management team and a separate financial and investment budget (Verhoeven, 2010). A PA’s business model is commercial in operation, that is that a PA has to break-even at least, preferable making profit. Income is earned by leasing land or by charging fees to incoming ships. A significant part of the profit is transferred as a dividend to certain stakeholders, in most cases the urban government (de Langen & Heij, 2014).

Arguably, this started a self-fulfilling prophecy. The logistical maritime sector especially experienced a thorough economy of scale, best illustrated by the container sector, in volume, size of ships and

¹ Corresponding author: K.B.J.VandenBerghe@TUDelft.nl

vertical and horizontal M&A (Jacobs & Notteboom, 2009; Ng et al., 2014; OECD, 2013). Consequently, rapidly the global maritime logistical sector moved towards a polarized hub-and-spoke network, changing the (global) market-shares inevitable with winners (cf. 'Rotterdamization' Notteboom (2018)), but far more losers among the ports (cf. Ducruet, Cuyala, & El Hosni, 2018). Especially for these 'winners', the question, though, is how far this is a 'natural' process or an induced process? Indeed, (implicitly) the dividend based business model of the (semi-)independent PAs favours (financial) growth and a focus on a (short-term) return of (mostly public) investments. The maritime logistics sector proved to be the best candidate as especially this sector needs on the one hand significant storage room for their terminals and on the other hand generates more ship movements, hence thus the self-fulfilling prophecy. As explained by other researchers in detail, the effects of this reciprocal relationship between 'natural' market preferences and regional/local institutional settings, is especially true for the port of Rotterdam. Rotterdam was chosen strategically during the 1980s as a key 'mainport' within (national) policy documents (Daamen, 2010; Huijs & Troost, 2014), meaning public investments since then were foremost used to (re)develop and improve the logistical parts of their port areas, within and towards the fore- and hinterland. This was done, for example, by creating new terminals, deepening canals, rivers, docks or building new road- or railways. Three decades of this reciprocal relation between (regional/local) policy and (global) market preferences made that port areas grew significantly in spatial terms, and increasingly the revenues of PAs are based on logistical activities (Van den Berghe, Meijers, & Witlox, 2019).

This self-fulfilling prophecy – both for 'winners' and 'losers' - is not without a risk. We increasingly observe (negative) consequences of the reciprocal relationship leading to the question: What if the financial short-term rational of the current business model of PAs no longer outweighs its (long-term) negative consequences? This question was put forward by the Dutch Council for Environment and Infrastructure (RLI) in their report 'Beyond the Mainport' (RLI, 2016). The RLI argues that the basic rationale of the mainport policy, namely that an increase in throughput equals an increase in economic competitiveness (put forward as "the air/seaports are the economic engines of The Netherlands" (Ministerie van Infrastructuur en Milieu, 2016)), is not/no longer correct, hence questioning the policy – and thus implicitly also the business model of the PAs – favouring logistical activities.

The aim of this chapter is to understand the more abstract background of this debate. To do this, the proposition of this chapter is that the reciprocal relationship between the market preference of the (in particular logistical) maritime sector and the adaption of the institutional structure of the port city (cf. landlord PAs) during last decades, has created a (self-fulfilling) bias of reality: namely that port and city are two different entities. Arguably, this bias is by now taking by granted, not at least within academia. Often, papers' argument of a separated port and city start by citing Bird (1963) or Hoyle (1989), authors of the functional-morphological sequential Anyport and Port-City interface model, respectively. These models do explain reality. Indeed in (m)any port (-cities) around the world, maritime functions indeed effectively moved out of urban cores. However, during the 20th century, this was also true for many other (former core) urban functions as retail, transport or sport (Ducruet & Lee, 2006). The difference between the port and these functions today, is that the latter are still (institutionally) part of the city, while the port is not. Hence, in other words, if we speak of port and city, are we referring to 'reality' or are we in fact referring to the bias?

We argue that having this discussion is a necessary one, because today after decades of (implicit) 'mainport' policy, the (conflictual) discussion between port and city is on an important tipping point, both in academia (cf. Daamen & Louw, 2016; Wiegmans & Louw, 2011) as in policy (cf. RLI, 2016). Do we indeed now study and adapt our understanding and policy of this conflict between port and city

we encounter² or do we check first if our – in this chapter proposed - self-fulfilling bias (by now) is the case or not?

By questioning the (biased) view of the port city, this chapter situates itself within a broader discussion within spatial planning (Cooke, 2018; Gleye, 2015) and human and economic geography (Boggs & Rantisi, 2003; Paasi, 2010), which arguably can be related to the ‘relational turn’. Also, for port cities, this relational turn first was called upon (cf. Ng et al., 2014), and has recently been explored (Hesse, 2017; Van den Berghe, Jacobs, & Boelens, 2018). After a short introduction of the relational approach (see section 2), this chapter tries to figure out if and how to deal with the bias we encounter ‘between’/‘within’ the port city, better known as the (relational) port-city interface (Hoyle, 1989; Van den Berghe, 2018; Van den Berghe et al., 2018). Therefore, this chapter’s research question is: *Is there a better way to understand the port-city interface, and, if so, what policy recommendations does this imply?* With this (pro-active) research question, this chapter (modestly) tries to engage in another important contemporary planning debate, namely how to be critical (realist) (Archer et al., 2013; Næss, 2015), first, but second also be able to (re)construct practical advice and foremost action in the spatial planning field (Cooke, 2018; Jessop, 2018)?

To do so, this chapter develops a new methodological approach, explaining a visualization method that can be used as a tool (section 3) to understand and (re)direct the policy of ports, cities, and of course port-cities. After presenting the application of this tool for the steel manufacturing sector in the port cities of Amsterdam and Ghent (section 4), we end this paper with a discussion and conclude with some research and policy recommendations (section 5).

2 The Relational Port-City

Within spatial applied sciences, such as geography or planning, three paradigms can be appointed, defining first how we perceive reality (in this paragraph by referring to ‘the region’), and second how, in particular for planning, we act upon this reality (cf. Bryant, Srnicek, & Harman, 2011). As explained by Paasi (2010), Bathelt and Glückler (2003) or (Agnew, 2013), the first, and oldest one, is landscape research. Hereby a region (cf. reality) is being constructed by aggregating variables. The construction of regions based on classification involves measurements in all kinds of ways, from for example historical-cultural measurements (e.g. the Hellenistic region), geomorphological measurements (e.g. Köppen-climate zones) to spatial functional measurements (e.g. rural versus urban areas). Within this first paradigm, one can place the work of Bird (1963), Hayuth (1982) and Hoyle (1989)³ among others, being arguably the core papers that ‘established’ a ‘port’ and/versus ‘city’ view. The empirical logic behind these studies is to map ‘out of the blue’ spatial land use (cf. functional-morphological). In this case aggregation then is based on the variable ‘urban’ versus ‘maritime logistics’, resulting thus in the geographically definition of ‘port’ and ‘city’. This method also enables to construct (functional-morphological) timelines. If considering enough case studies, one can (extensively) make abstraction of the context, develop spatial models and in turn try to find general properties and patterns (Bhaskar, 2008 [1975]; Sayer, 2010 [1984]), cf. the Any Port model or Port-City Interface model (see Carpenter and Lozano, 2019).

² A good example of a contemporary conflict following the biased port-versus-city view is Amsterdam, whereas ‘HavenStad’, a full functioning port area, is being appointed by the city authority to be redeveloped as a residential area, based on the idea ‘port out, city in’ (Pliakis, 2019).

³ Although Hoyle (1989, p. 429) himself criticized the functional-morphological view on port cities stating that the port-city interface is “an interactive economic system” (Van den Berghe, Jacobs, Boelens, 2018)

The second paradigm relates to spatial science whereby the region is a given. Landscape as a naturalistic conception of space became replaced by an abstract conception, or a formal geometry. Whereas the first paradigm works towards the construction of a region, within this second paradigm, research starts from the constructed region. In other words, the region is taken for granted and one focusses on explaining its (broad) performance and operation. This positivist influenced paradigm is wide spread following it suits perfectly for the increased demand for applied research on the one hand, and the increasing use of (geographical) data on the other hand. Much of this data is gathered within the framework of statistical Nomenclature of Territorial Units for Statistics (NUTS) regions. Back to the port city, arguably, this paradigm is the main reason of the creation of the (sub)discipline of 'port geography'. Indeed, the 'historical-monographic approach' became increasingly replaced by (econometric) modelling and performance studies, focussing on for example supply chains and management structures (Ng et al., 2014, p. 86). Studies have started gathering data from the institutional-administrative defined port areas, making it on the one hand capable to compare them with each other (cf. 'list mania'), but on the other hand, also enforcing further the idea that port and city are two separate (economic) entities. In turn, and this is the core of the self-fulfilling prophecy, the basic research design of such studies (logically) recommend towards policy that a dedicated institution will improve the ports' competitiveness.

The third perspective is the relational approach. It finds itself somewhere between landscape research and spatial science. On the one hand, it acknowledges the rational and influence of regions, on the other hand it acknowledges that these regions are not a given, but are social constructs. In other words, "regions condition and are conditioned by politics, culture, economics, governance and power relations" (Paasi, 2010, p. 2297). Back to the port city, this implies two things. First, the port and city exist as a structuralized effect, and hence are a reality defining and influencing our behaviour. In other words, because of mobility and environmental regulations for example, a grain trading firm as Cargill will open its terminal not in the city centre, but in a port area, regulating and thus allowing such functions to develop and prosper. Second, although port and city are structuralized effects, they are not an 'absolute' given but only 'in permanence'. In other words, if no maritime functions, such as Cargill, would operate within port areas, these port areas (ditto for urban areas) stop existing, eventually becoming a (urbanist/architectural) relict (so-called 'portscapes') or just disappear in time. Although there are exceptions in studies applying these ideas (cf. for port studies Vance, 1970), this third perspective is still little touched upon, especially towards practical (policy) advice (Cooke, 2018), and hence a promising starting point to develop our visualization method.

3 A Visualisation Method

Before we explain the used method, first we need to explain three different aspects of networks: (i) its boundaries; (ii) its structure and hierarchy; and (iii) its pluralistic nature.

3.1 Networks

First, networks are per definition open and endless, in time as space. From an analytical point of view, this poses a problem, because this entails a network is impossible to examine as one does not know what to include and where to stop. Generally, the chosen 'moment' the analytical time is stopped depends strongly on the available data. Even if the data is relatively recent, the outcomes are per definition always dated as reality never stops. To analytically define the relevant extent of networks, Menzel and Fornahl (2009) argued to combine the thematic boundary and the spatial boundary of the network(s) taken into account. In other words, the spatial and relational characteristics of the network are combined to reveal its 'horizon' (Van Der Haegen & van Weesep, 1974) beyond which the influence and relevance diminishes quickly. The thematic boundary

distinguishes a network based on a common definition, for example a financial network, a logistical network, a social network, etc. As such, a network can be isolated from the environment it's both part of and constitutes (e.g. a society). The spatial boundary isolates the network geographically from the same kind of network located elsewhere.

Next, a network has a structure and hierarchy. Both are correlated and give an indication of the differences in importance among the nodes within the network (Denicolai, Zuchella, & Cioccarelli, 2010). For example, if one deals with a hub-and-spoke network, the indication is that the central node is more important than the other nodes. To check this, one can apply different kinds of (social) network techniques computing centrality or connectivity figures (Yeung, 2000).

The third aspect is the pluralistic nature of networks. This is often forgotten, not at least within port studies. Indeed, (quantitative) studies tend to focus on one particular type of network. For example by focussing on container flows to reveal the changing (global) network of container ports (Ducruet, 2016), or corporate (HQ-subsidary) firm relations to find a (global) hierarchy of cities (Sassen, 2000; Taylor, Evans, & Pain, 2008). However, there is limited analysis on the 'overall network' constituted by different types of networks together. The lack of such research is due to the fact that disentangling correlated networks is a difficult exercise (Boggs & Rantisi, 2003), although a better understanding of the confluence of different types of networks, their different structures and different hierarchies can help to understand locational differences. For example, Giuliani (2007) analysed the characteristics of the business and knowledge networks for three wine clusters in Italy. Both networks have a strongly differing structure and hierarchy. While a business network is homogenous and fairly distributed, connecting fairly all economic actors within a certain region (e.g. rotary club), a knowledge network is very selective, less dense with only a limit of relations, and strong hierarchically. In other words, following the rationales different networks have, in this case respectively information and trust, networks differ in structure and hierarchy (Boschma, 2005; Malmberg, 2003). How these two – or more – networks relate and interfere with each other, can help to better understand the complex relation between flows and spaces, also for port cities (cf. Ng et al., 2014).

Taken into account the network boundaries, the structure and hierarchy of networks, and the plurality of networks at work, in this research, related to our research subject – the port-city interface, we focus on six non-exclusive different types of networks (Table 1).

Table 1: The different networks taken into consideration (Van den Berghe et al., 2018)

	Relational type	Explanation	Examples
1	Input/Output	For the production of goods	grains, diesel, organic waste
2	Energetic	Used as input for support of production of goods	electricity, diesel, heat
3	R&D	The (fundamental) research and development of production of goods or production processes	processes in (lab-) environments
4	Advanced producer services	Services in support of (maritime) production/transport activities	engineering, IT services, insurance, legal advice
5	Membership/ Association	Organisation in which companies/institutions meet each other (de Langen, 2002)	association, labour union, chamber of commerce
6	Shareholder	Full or partial ownership of shares	mother/daughter companies

Source: Kuipers et al. (2015); Vandermeulen, Nolte, and Van Huylbroeck (2010); annual company reports; company websites; Orbis/Belfirst Bureau van Dijk; LISA database

First, the physical and linear exchange of (i) commodities and production inputs and outputs through transshipment and cargo handling is one of the main exchange relations within port (city) regions.

Goods are bought or sold for storage (cf. speculation) or processing further in the value chain. Second, (ii) the energetic relations differ from commodities as they are input for the production process, and not as input for the production of the product. Third, (iii) R&D deal with knowledge production among actors. Although these can be internalised within one actor – as all relations – we focus in particular on the inter-firm knowledge production (de Langen, 2002). Fourth, IT, insurance, engineering, and legal supporting services are known as (iv) advanced producer services (Jacobs, Ducruet, & De Langen, 2010). Fifth, (v) associations increase the chance of cooperation, crossovers and possible innovation trajectories (de Langen, 2002). Last, we focus on (vi) the shareholder relations, going from full ownership to partial shareholders.

3.2 Database model

The database model used for this chapter has a typical two-table From-To structure. In other words, nodal data (the actors involved) is combined with the (6-type) relational data connecting these different nodes. This database model thus creates the network and can be visualised eventually. However, for our visualisation we needed to add a second layer to examine the port-city interface. Indeed, we needed to 'locate' the nodes in space, in this case port or city. To do this, we use the institutional-administrative areas of port(s) and city/cities involved.

For the nodal data, we relied on several national and international socio-economic databases. For Belgium and The Netherlands respectively, the national datasets used were the Knack Top Trends database and the 'FOD Economie Kruispuntbank van Ondernemingen (KBO)' from the National Bank of Belgium (NBB), and the LISA (Landelijk Informatiesysteem van Arbeidsplaatsen en vestigingen) database (van Oort, 2004). These databases were completed with the international database Orbis Bureau van Dijk, which publishes trans-national and -regional firm data collected from different national databases. The different databases can be connected by the unique settlement number given to every economic actor. The nodal database gives us the possibility to differentiate the economic actors along different variables, such as their (institutional) location (cf. port, city), the number of employees, public/private, (trans)national, profit, (in)tangible assets, etc.

Similar to the nodal data, the relational data can be differentiated. The first and most important variable is the general type of relation (Table 3-1). Our database offers the possibility to further differentiate the relational data. Although this data is more difficult to collect plus is more arbitrary, relations can be differentiated based on for example financial data (how much value is transferred), throughput data (tonnage), or shareholder participation (percentage of stocks owned).

The database model links the nodal and relational table on a one-to-many relational (e.g. one company can have relations with more than one company) (Figure 1).

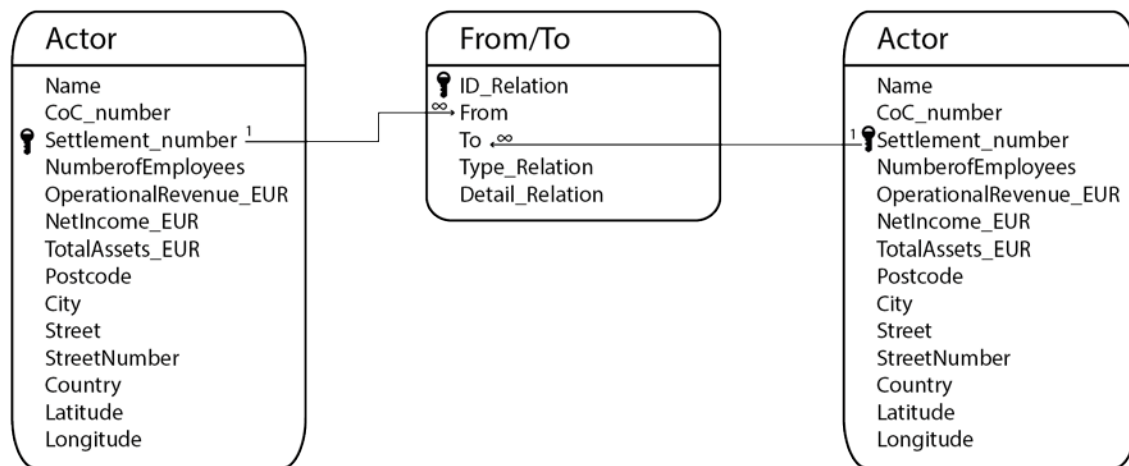


Figure 1: The database model design linking the nodal company socio-economic table (left and right) with the relational From/To table (middle) using a one-to-many relation. (cf. key symbols are the primary keys within the Access database)

The obtained database (constructed using Microsoft Access 2016) provides us thus with multiple visualisation options, related to the research question asked. In this research, we have chosen to use a ‘basic’ visualisation option, whereby we differentiate the nodes based on their employment figures on the one hand, and the relational data based on their (cf. #6) type of relation. Latter could be further differentiated, most logically based on their quantitative financial or tonnage data, but the downside is that this makes the overall network more difficult to interpret (cf. difficult to quantify knowledge), and hence (implicitly) devalues some types of network in favour of other.

3.3 Visualisation

The next step is to convert and implement the database in ArcGIS ArcMAP 10.3. This gives us two linked shapefiles: a point features shapefile and a polyline features shapefile. These two shapefiles are subsequently transformed to a geographical network (GN). Within ArcMap, this GN can eventually be combined with the institutional-administrative layer to locate the network in space. However, the ‘regular’ Euclidian visualisation gave us an analytical problem (cf. Adams (2014)). Some nodes in our network are located on the same location (cf. high rise office building) or closely together, especially within linear port areas. Hence, once the relations are plotted, many of these overlap and become blurred or covered, making important information lost in the visualisation (Figure 2).

One needs to make abstraction of the geographical Euclidian distances, without losing its information. To achieve this, we used ArcMAP extension Schematics⁴. Frequently used within engineering-electrical analyses, schematics visualises networks by topological spreading the nodes and relations. However, it does not lose the coordinates attached to the nodes, enabling it to group the nodes based on their administrative location. Hence, we can present our visualisation method (Figure 3).

⁴ <https://www.esri.com/en-us/arcgis/products/arcgis-schematics/overview>

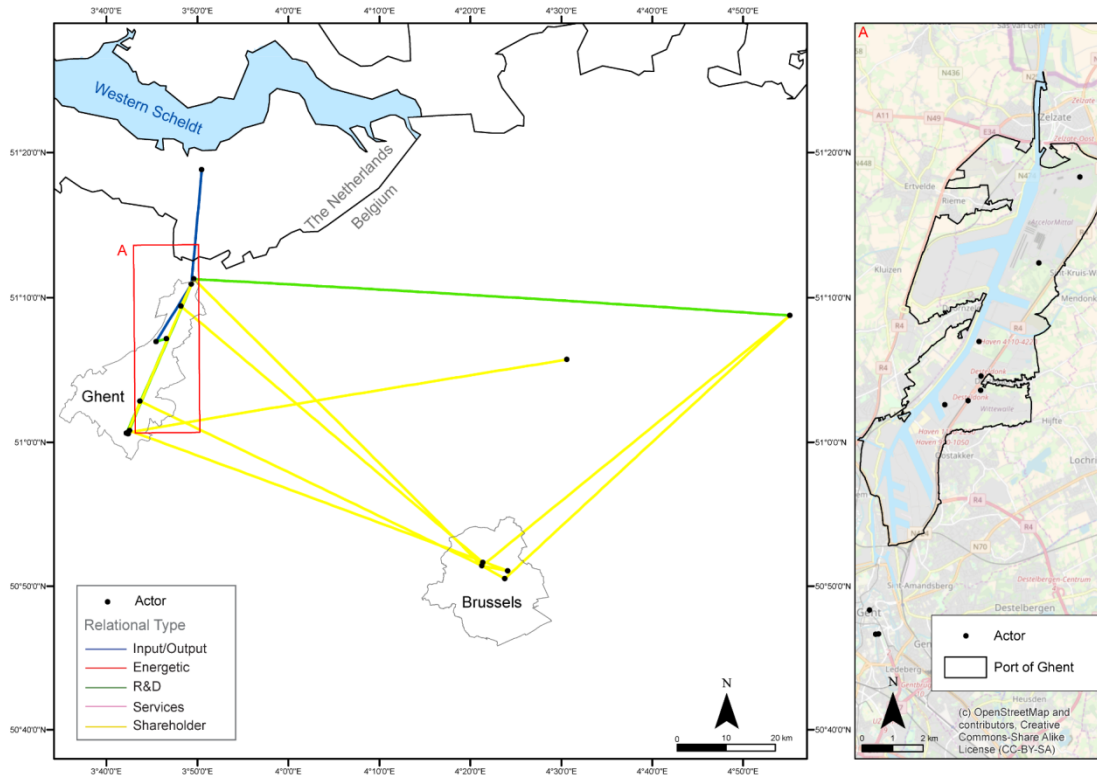


Figure 2: Euclidian visualisation of the steel manufacturing sector in Ghent, total network and zoom in on the Port of Ghent where involved nodes are closely located to each other, overall visualisation unsuitable for further analysis

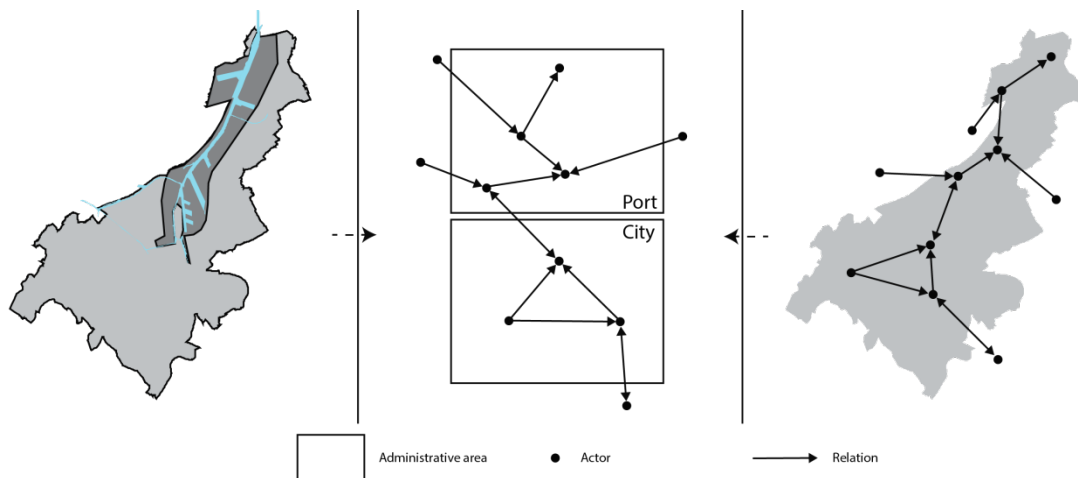


Figure 3: Visualisation method combining institutional-administrative information (left) and the structure, hierarchy and direction (From/To) of the involved economic network(s) data (right), example Ghent (Van den Berghe et al., 2018)

4 Results

In this section, the relational port-city interfaces of the steel manufacturing sector in the port-cities of Ghent and Amsterdam is represented.

4.1 The Steel Manufacturing Sector in Ghent

The steel manufacturing sector in Ghent centres around its main steel plant, ArcelorMittal Ghent. The steel plant was founded in 1962, under the name Sidmar in the port of Ghent, along the canal Ghent-Terneuzen. Characterizing the whole (European and global) steel market (Capron, 2003; Mény, Wright, & Rhodes, 1987), also Sidmar experienced several mergers and consolidations. First, it

became part of the Luxembourg located Arcelor in 2002. Shortly after, Arcelor merged with the Indian Mittal Steel, forming ArcelorMittal, by far the biggest steel producer worldwide (Kanter, Timmons, & Giridharadas, 2006).

Taking in account this short contextual description of the steel plant in Ghent, we present the relational port-city interface of the steel manufacturing sector in Ghent (Figure 4). The port-city interface represents the overall network of the six (if relevant) different networks, this within, between and beyond the institutional-administrative port city of Ghent.

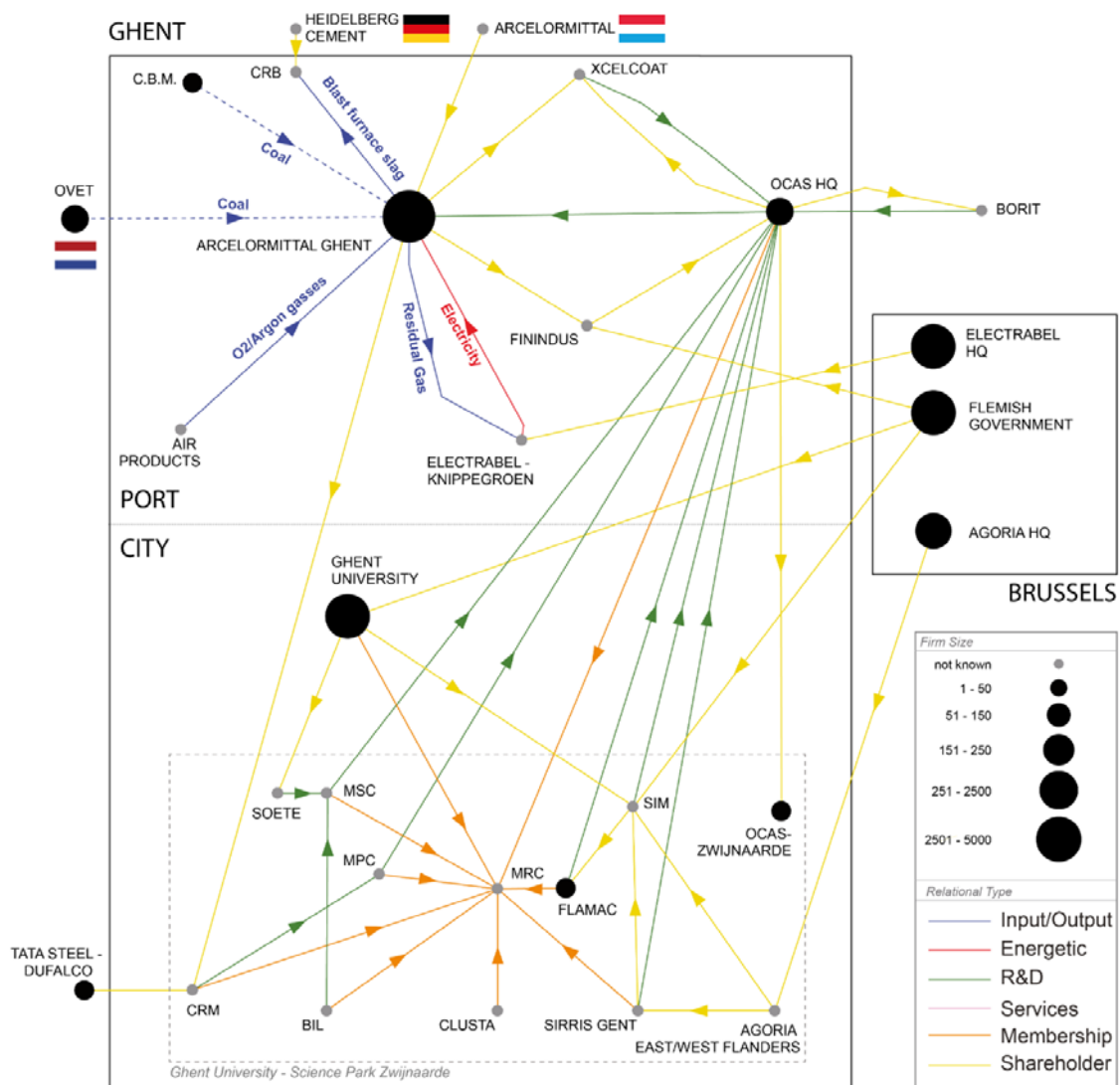


Figure 4: The relational port-city interface of the steel manufacturing sector in Ghent, 2018

As shown in Figure 4, the steel plant in Ghent is designed as a maritime integrated plant. This implies that almost all production processes take place within the same factory; from the intake of iron ore and coal bulk ships to the eventual output of steel plates and other steel products by train or ship. In other words, the (i) Input/Output network is limited, implying we can label the steel plant as a stand-alone actor – reflected also in the number of employees. The only existing inter-firm input/output relations are rather minor important for the production of steel and deal with the back-up input of coal, the output of blast furnace slag that is converted to concrete, and the input and output of residual (production and emission) gasses. Latter relates to the only (ii) energetic relation, namely the burning of emission gasses to produce electricity, used for the production process (Van Dyck,

2009). The (iii) R&D network reveals an important element of the existing steel manufacturing port-city interface in Ghent. As shown, a rather remarkable regional knowledge network exists between the steel plant and several (semi-)private/public research firms clustered in the science park Zwijnaarde of the Ghent University. The structure and hierarchy of the R&D network, however, shows that not the steel mill itself is central. The R&D network centres around OCAS. To explain this, one has to understand the history of the 'two' parts of the knowledge network, the steel mill and the Ghent University. First, OCAS was founded in 1948 as the engineering department within Cockerill-Sambre steel group, a (far) predecessor of ArcelorMittal today. Second, the Ghent University has a long tradition in the academic research of steel, related to its industrial heritage (Boussauw, 2014). However, the presence of both (production and research related to steel manufacturing) within Ghent, doesn't explain the current network. The moment the two strategically coupled (Jacobs & Lagendijk, 2014; Van den Berghe et al., 2018) can be appointed to 2004 when the decision was made to change the engineering department of ArcelorMittal – thus OCAS – into a joint-venture (JV) research institution together with the Flemish Government, latter investing 30 million euros. This was intentional and part of the long-term strategic plan 'Steel-Friendly Flanders' aimed at strengthening the knowledge relation between the academic part and the industrial part of the steel manufacturing sector (Vlaamse Overheid, 2004). Being a JV, OCAS could broaden its research activities beyond ArcelorMittal's products and interests, and actively participate within partnerships and (academic) research programs, even with competitors of ArcelorMittal as Borit. The establishment of this hub between research and production soon proved to be successful and within a few years, numerous spin-offs were established on the one hand, while also OCAS could increase its research budget to 100 million euros and double its research employees (Mooijman, 2006; OCAS, 2016). Related to the knowledge network emerged within and around the Science Park of the university, is the network of (v) memberships whereby the research centres are part of the consortium Materials Research Cluster (MRC) joining forces and sharing laboratory space and equipment. Finally, the financial network shows the independent character of the research cluster towards the industrial part, cf. ArcelorMittal. The research cluster is foremost controlled by public shareholders, but as explained, the most apparent part is that since its establishment as a JV, regional partners (cf. Flemish Government) have a say in the future of OCAS, and hence the (long-term) build-up knowledge network.

4.2 Amsterdam

The steel plant TATA Steel in Amsterdam celebrated recently in 2018 its 100th birthday since it was established in IJmuiden, a small municipality near Amsterdam where the 25km long North Sea Canal coming from Amsterdam flows in the North Sea. 1918 is no coincidence, because World War I showed the importance of having at least one steel plant within the country when borders closed and import of steel – coming from Belgium/Germany/France prior to the war – stopped and constrained economic and military production processes (Versteegh, 1994). Different than in the 19th century, it was no longer necessary to locate the steel plant close to the iron ore and coals mines (cf. Southern Belgium and Ruhr Area), but more strategically to locate the steel plant on a maritime location, where more easily the increasingly cheaper foreign coal and iron ore could be imported, hence the decision to build the Dutch steel plant ('Hoogovens') in IJmuiden along the coast and the North Sea Canal connecting the hinterland (AWN, 2006).

Starting rather small, during next decades, the steel plant quickly enlarged significantly and became an integrated industrial complex wherein the different input and output of (residual) products is orchestrated. Similar to ArcelorMittal, especially since the 1970s also Hoogovens experienced subsequent crises and consolidations. After a failed merger with the German Hoesch, Hoogovens eventually in 1999 merged with the – under Thatcher liberalized - British Steel into Corus (Baeten,

generation blast furnace, needing less coal and iron ore. As shown, TATA Steel IJmuiden externalized more (iv) service relations than ArcelorMittal. The involved firms are mostly engineering firms specialized in maintaining machines. No relevant (vi) membership relations were detected. Finally, (vi) financially, one could argue most parts of the overall network are in foreign hands, mostly controlled by the Indian TATA group. This is even more so, because as shown a significant part of the steel output of TATA Steel IJmuiden goes to TATA's owned car company Jaguar/Land Rover. TATA controls (in)directly the R&D network in Delft, by being the main sponsor of the research departments.

5 Discussion and conclusions

Although the two case studies deal with the same economic sector, are relatively closely located, and therefore share a fairly similar path-dependent social, economic and institutional context, for numerous reasons one has to avoid making (simplistic) abstraction of the important differences in these path-dependent contexts. A 'grand' theory of the (evolution) of the port-city (interface) is thus not possible (cf. Rodrigo *et al.*, 2014). However, what we can do is use our method and our empirical results to find general properties and patterns related to the port-city interface. One could argue this is exactly the same as the models of Bird (1963) or Hoyle (1989), which is true if they are critically seen in their descriptive quality, therefore we want to underline our results are *descriptive*, not *explanatory* (Sayer, 2010 [1984], pp. 163-164). Related to our proposition of our biased view on the port city, we now can assess if our empirical results based on another method (relational-institutional instead of functional-morphological) indeed provides similarities or differences.

First, the results confirm that in relational terms, the port-city interface exists. We found significant networks between the maritime and urban economy that constitute and are constituted by the existence of the port-city interface, at least in reference to the steel manufacturing sector in Ghent. The latter is important to stress out because this result still does not say that the 'overall' port-city interface exist, or doesn't exist, nor if we can label the interface 'good' or 'less good'. As shown by Van den Berghe (2018), different – even numerous – interfaces exist within and around the port city of Ghent. This implies thus that we even cannot make a general statement of one port city. Indeed, for example in Ghent, the car manufacturing sector port-city interface is (almost) non-existent, at least not based on the type of relations considered. Taken this into account, we can state that for the steel manufacturing sector in Amsterdam, the port-city interface is weak – although differs if the urban economy of Amsterdam includes Delft, but this is another discussion - . In this sector, no significant economic relations exist, understood as a significant combination between the maritime and urban economy. However, similar to Ghent, Van den Berghe et al. (2018) also found that for other sectors in Amsterdam, such as the bio-based sector, do significantly constitute the port-city interface.

At this point one could say this paper presents a paradox, because the port-city interfaces shown are existing and non-existing at the same time. The visualisation depends on the (specific or general) focus one has – a flexibility the database model offers. However, the plurality of possible visualisations is in essence the added value of the method. The goal was to see if there are other 'truths' of the port-city interface, derived from other applied perspectives. Indeed, applying a relational perspective does identify other findings of the port city. The relational geometries show that in contrast to the spatial perspective, (some) port and city (interfaces) did not separate (others did), but are (for some maybe more than ever) connected. Going one step further, and if one finds significant relations, one could argue that in this case (e.g. steel manufacturing interface Ghent), port and city are not/have never been separate entities. However, this in turn is also not true, because

even for the steel manufacturing interface in Ghent, port and city are structuralized effects (in permanence though), not at least in regulation and institutional-administrative terms.

To conclude: port and city are connected, and at the same time also separated (see also chapter by Carpenter and Lozano (2019) in this book). However, this is exactly the point and the main finding. Indeed, the relational geometries provide an example of the reciprocal relation of a region put forward by Paasi (2010, p. 2297), translated in this case: *a port-city interface conditions and is conditioned by politics, culture, economics, governance and power relations*.

Hence, one can reflect on the second part of our research question, the pro-active part aimed at practical (policy) advice (Cooke, 2018). First, for numerous reasons it is understandable that in many port cities, during last decades, (semi-)private port authorities were created. Following the spatial and economic changing preferences and context of maritime functions (as many other former core urban functions), it is indeed in terms of economic performance (cf. spatial science) not a bad idea to adapt your governance to the posed challenges, in this case by creating a dedicated institutional entity. Second, however, this new created institutional 'reality', based thus on a specific part (foremost spatial and logistical) of the port economy, at least 'mentally' can create a new reality, in turn influencing, after a while, our (spatial) policy, eventually thus creating a new 'reality'. In other words, one could wonder if the observed (spatial) conflicts between port and city (cf. Wiegman & Louw, 2011) are 'natural' conflicts or self-fulfilling conflicts, an (implicit) outcome thus of the (landscape research) 'observation' decades ago, reinforced by following (spatial science) performance research, that port and city are two separate entities and today create huge problems/challenges (Daamen & Louw, 2016).

Within political debates regarding port-cities, quickly one can detect spatial 'pro-city' or 'pro-port' positions (cf. Wiegman & Louw, 2011). In many of these spatial policy discussions, both have legitimate reasons to be chosen for. However, we do want to stress out the self-fulfilling reciprocal relation between the used, and mostly taken for granted, bias towards 'reality', and the policy or (academic) research plans we formulate. To formulate one policy recommendation, we conclude therefore that first one has to acknowledge that the perceived conflicts in many port cities are not 'natural' ones, but arguably a 'meta-conflict'. Indeed, for the number of port cities experiencing (spatial) conflicts, one can put a same number of port cities having none. In fact, this already poses the question '*if the current applied policy strategy by port authorities to (re)improve the port-city relation by building maritime museums or build cruise terminals in the city centre (cf. waterfront) is really the right policy measure to create/improve the relation (what relation?); or in fact is just another aspect further accelerating our bias of the separate port city?*' Therefore, second, to answer such a question, one needs to understand each port city, or in fact each port-city interface. This can only be achieved if one really dives deeply into the case study as a researcher, but more especially as a policy maker. Although not at all perfect, we think our visualisation method has the potential to guide this 'dive'.

References

- Adams, R. E. (2014). Natura Urbans, Natura Urbanata: Ecological Urbanism, Circulation, and the Immunization of Nature. *Environment and Planning D: Society and Space*, 32(1), 12-29. doi:10.1068/d17012
- Agnew, J. A. (2013). Arguing with Regions. *Regional Studies*, 47(1), 6-17. doi:10.1080/00343404.2012.676738
- Archer, M., Bhaskar, R., Collier, A., Lawson, T., & Norrie, A. (2013). *Critical realism: Essential readings*: Routledge.
- AWN. (2006). Van Hoogovens tot Tata. *Archeologische Werkgroep Beverwijk-Heemskerk*. (From Hoogovens to TATA. *Archaeological Working Group Beverwijk-Heemskerk*)
- Baeten, P. (2007, 19/01/2007). Korte historie van Hoogovens in IJmuiden: de ideale lokatie voor een staalbedrijf. *Kennislink*. (A short history of Hoogovens IJmuiden: the ideal location for a steel plant. *Knowledge Link*)
- Bathelt, H., & Glückler, J. (2003). Toward a relational economic geography. *Journal of economic geography*, 3(2), 117-144. doi:10.1093/jeg/3.2.117

- Bhaskar, R. (2008 [1975]). *A realist theory of science*: Routledge.
- Bird, J. (1963). *The major seaports of the United Kingdom*. London: Hutchinson.
- Boggs, J. S., & Rantisi, N. M. (2003). The 'relational turn' in economic geography. *Journal of economic geography*, 3(2), 109-116.
- Boschma, R. (2005). Proximity and innovation: A critical assessment. *Regional Studies*, 39(1), 61-74.
doi:10.1080/0034340052000320887
- Boussauw, K. (2014). City profile: Ghent, Belgium. *Cities*, 40, Part A(0), 32-43.
doi:http://dx.doi.org/10.1016/j.cities.2014.04.004
- Bryant, L. R., Srnicek, N., & Harman, G. (2011). *The speculative turn : continental materialism and realism*: Melbourne re.press.
- Carpenter, A. and Lozano, R. (2019). Proposing a framework for anchoring sustainability relationships between ports and cities. In: Carpenter, A. and Lozano, R. (Eds.) *European Port Cities in Transition: Moving Towards More Sustainable Sea Transport Hubs*. Strategies for Sustainability Series. Springer
- Capron, M. (2003). La sidérurgie en Wallonie entre Usinor, Duferco et Arcelor. *CRISP*. (Steel manufacturing in Wallonia between Usinor, Duferco and Arcelor)
- Cooke, P. (2018). Retrospect and prospect: from a new dark age to a new dawn of planning enlightenment. *European Planning Studies*, 26(9), 1701-1713. doi:10.1080/09654313.2018.1499429
- Daamen, T. (2010). *Strategy as Force: Towards Effective Strategies for Urban Development Projects: The Case of Rotterdam City Ports*: IOS Press.
- Daamen, T., & Louw, E. (2016). Window on the Netherlands: The Challenge of the Dutch Port-City Interface. *Tijdschrift voor economische en sociale geografie*.
- de Langen, P. (2002). Clustering and performance: the case of maritime clustering in The Netherlands. *Maritime Policy & Management*, 29(3), 209-221. doi:10.1080/03088830210132605
- de Langen, P., & Heij, C. (2014). Corporatisation and Performance: A Literature Review and an Analysis of the Performance Effects of the Corporatisation of Port of Rotterdam Authority. *Transport Reviews*, 34(3), 396-414.
doi:10.1080/01441647.2014.905650
- Denicolai, S., Zuchella, A., & Cioccarelli, G. (2010). Reputation, trust and relational centrality in local networks: an evolutionary geography perspective. In R. Boschma & R. Martin (Eds.), *The handbook of evolutionary economic geography* (pp. 559). Cheltenham: Edward Elgar Publishing Limited.
- Ducruet, C. (2016). The polarization of global container flows by interoceanic canals: geographic coverage and network vulnerability. *Maritime Policy & Management*, 43(2), 242-260. doi:10.1080/03088839.2015.1022612
- Ducruet, C., Cuyala, S., & El Hosni, A. (2018). Maritime networks as systems of cities: The long-term interdependencies between global shipping flows and urban development (1890–2010). *Journal of Transport Geography*, 66, 340-355. doi:10.1016/j.jtrangeo.2017.10.019
- Ducruet, C., & Lee, S.-W. (2006). Frontline soldiers of globalisation: Port–city evolution and regional competition. *GeoJournal*, 67(2), 107-122. doi:10.1007/s10708-006-9037-9
- Giuliani, E. (2007). The selective nature of knowledge networks in clusters: evidence from the wine industry. *Journal of economic geography*, 7(2), 139-168. doi:10.1093/jeg/lbl014
- Gleye, P. H. (2015). City Planning versus Urban Planning: Resolving a Profession's Bifurcated Heritage. *Journal of Planning Literature*, 30(1), 3-17. doi:10.1177/0885412214554088
- Hayuth, Y. (1982). The Port-Urban Interface - an Area in Transition. *Area*, 14(3), 219-224.
doi:http://www.jstor.org/stable/20001825
- Hesse, M. (2017). Approaching the Relational Nature of the Port-City Interface in Europe: Ties and Tensions Between Seaports and the Urban. *Tijdschrift voor economische en sociale geografie*. doi:10.1111/tesg.12282
- Hoyle, B. S. (1989). The Port City Interface - Trends, Problems and Examples. *Geoforum*, 20(4), 429-435. doi:10.1016/0016-7185(89)90026-2
- Huijs, M., & Troost, M. (2014, 02/03/2014). Bruggen slaan tussen haven en stad. Rotterdam World Port City 2030. *GO*. (Bridging the port and city)
- Jacobs, W., Ducruet, C., & De Langen, P. (2010). Integrating world cities into production networks: the case of port cities. *Global Networks-a Journal of Transnational Affairs*, 10(1), 92-113.
- Jacobs, W., & Lagendijk, A. (2014). Strategic coupling as capacity: how seaports connect to global flows of containerized transport. *Global Networks*, 14(1), 44-62. doi:10.1111/glob.12035
- Jacobs, W., & Notteboom, T. (2009). *A theory on the co-evolution of seaports with application to container terminal development in the Rhine-Scheldt Delta*.
- Jessop, B. (2018). Neoliberalization, uneven development, and Brexit: further reflections on the organic crisis of the British state and society. *European Planning Studies*, 26(9), 1728-1746. doi:10.1080/09654313.2018.1501469
- Kanter, J., Timmons, H., & Giridharadas, A. (2006, 25/06/2006). Arcelor agrees to Mittal takeover. *The New York Times*.
- Kreling, T., & Schoorl, J. (2019, 25/02/2019). Tata Steel zegt sorry voor hinder van aanhoudende stofwolken. *Volkskrant*. (TATA says sorry for the annoyance from persistent dust clouds)
- Kuipers, B., De Jong, O., van Raak, R., Samders, F., Meesters, K., & van Dam, J. (2015). *De Amsterdamse haven draait (groen) door: Op weg naar duurzaam concurrentievoordeel door inzet op de biobased en circulaire economie*. (The port of Amsterdam turns green: Towards a sustainable competitive advantage through commitment to the biobased and circular economy)

- Lozano, R., Carpenter, A., & Huisingh, D. (2015). A review of 'theories of the firm' and their contributions to Corporate Sustainability. *Journal of Cleaner Production*, 106, 430-442. doi:<https://doi.org/10.1016/j.jclepro.2014.05.007>
- Malmberg, A. (2003). Beyond the cluster - local milieus and global economic connections. In J. Peck & H. W.-C. Yeung (Eds.), *Remaking the Global Economy: Economic-Geographical Perspectives*: SAGE Publications.
- Mény, Y., Wright, V., & Rhodes, M. (1987). *The Politics of Steel: Western Europe and the Steel Industry in the Crisis Years (1974-1984)*: Walter de Gruyter.
- Menzel, M.-P., & Fornahl, D. (2009). Cluster life cycles—dimensions and rationales of cluster evolution. *Industrial and Corporate Change*. doi:10.1093/icc/dtp036
- Ministerie van Infrastructuur en Milieu. (2016). *Actieagenda Schiphol. Brief aan de Tweede Kamer*. (Schiphol Action Agenda. Lettre to the House of Representatives)
- Mooijman, R. (2006, 06/04/2006). Het Imec van het staal. Onderzoekscentrum Arcelor Vlaams verankerd. *De Standaard*. (The Imec of steel. Anchoring the research centre of Arcelor)
- Næss, P. (2015). Critical Realism, Urban Planning and Urban Research. *European Planning Studies*, 23(6), 1228-1244. doi:10.1080/09654313.2014.994091
- Ng, A. K. Y., Ducruet, C., Jacobs, W., Monios, J., Notteboom, T., Rodrigue, J.-P., . . . Wilmsmeier, G. (2014). Port geography at the crossroads with human geography: between flows and spaces. *Journal of Transport Geography*, 41(0), 84-96. doi:10.1016/j.jtrangeo.2014.08.012
- Notteboom, T. (2018, 18/02/2018). Towards a "Rotterdamisation" of the european container port system? *PortEconomics*. OCAS. (2016, 02/2015). OCAS: Company History.
- OECD. (2013). *The Competitiveness of Global Port-Cities: Synthesis Report*. Retrieved from Rotterdam:
- Paasi, A. (2010). Commentary. *Environment and Planning A*, 42(10), 2296-2301. doi:10.1068/a42232
- Pliakis, F. (2019). 'A New City in the Port'. *An actor-centered institutional analysis of the strategic governance and planning process around Amsterdam Haven-Stad*. (Master), Delft University of Technology, Delft.
- RLI. (2016). *Mainports voorbij*. (Beyond Mainports)
- Sassen, S. (2000). *Cities in a world economy* /Saskia Sassen: Pine Forge press.
- Sayer, A. (2010 [1984]). *Method in Social Science: A realist approach*: Taylor & Francis.
- Taylor, P. J., Evans, D. M., & Pain, K. (2008). Application of the Interlocking Network Model to Mega-City-Regions: Measuring Polycentricity Within and Beyond City-Regions. *Regional Studies*, 42(8), 1079-1093. doi:10.1080/003434300701874214
- Van den Berghe, K. (2018). *Planning the Port City. A Contribution to and Application of the Relational Approach, Based on Five Case Studies in Amsterdam (The Netherlands) and Ghent (Belgium)*. Assen: InPlanning.
- Van den Berghe, K., Jacobs, W., & Boelens, L. (2018). The relational geometry of the port-city interface: Case studies of Amsterdam, the Netherlands, and Ghent, Belgium. *Journal of Transport Geography*, 70(C), 55-63. doi:<https://doi.org/10.1016/j.jtrangeo.2018.05.013>
- Van den Berghe, K., Meijers, E., & Witlox, F. (2019). Infrastructuur, ruimte en grenzen: havenontwikkeling en de strijd om de Schelde. In *Utopie voor realisten: De (Europese) toekomst van Vlaanderen en Nederland*. (Infrastructure, space and borders: port development and the battle for the Scheldt. Utopia for Realists: The (European) future of Flanders and the Netherlands)
- Van Der Haegen, H., & van Weesep, J. (1974). Urban Geography in the Low Countries. *Tijdschrift voor economische en sociale geografie*, 65(2), 79-89. doi:10.1111/j.1467-9663.1974.tb01217.x
- van der Lugt, L., de Langen, P., & Hagdom, E. (2015). Beyond the landlord: worldwide empirical analysis of port authority strategies. *International Journal of Shipping and Transport Logistics*.
- van der Lugt, L., Dooms, M., & Parola, F. (2013). Strategy making by hybrid organizations: The case of the port authority. *Research in Transportation Business & Management*, 8, 103-113. doi:<https://doi.org/10.1016/j.rtbm.2013.06.005>
- Van Dyck, B. (2009). *Reststromen in de Gentse Kanaalzone: Onderzoek naar mogelijkheden voor uitwisseling en valorisatie*. (Residual flows in the Ghent Canal Zone: Research into possibilities for exchange and valorisation)
- van Oort, F. (2004). *Urban Growth and Innovation: Spatially Bounded Externalities in the Netherlands*: Ashgate.
- Vance, J. E. (1970). *The Merchant's World: The Geography of Wholesaling*: Englewood Cliffs (N.J.): Prentice-Hall.
- Vandermeulen, V., Nolte, S., & Van Huylenbroeck, G. (2010). *Hoe biobased is de Vlaamse economie?* (How biobased is the Flemish economy?)
- Verhoeven, P. (2010). European Port Governance. *European Sea Ports Organization (ESPO)*.
- Versteegh, A. P. (1994). *De onvermijdelijke afkomst?: de opname van Polen in het Duits, Belgisch en Nederlands mijnbedrijf in de periode 1920-1930*. (The inevitable origin: the inclusion of Poland in the German, Belgian and Dutch mining company in the period 1920-1930)
- Vlaamse Overheid. (2004). *Beleidsnota Financien en begroting 2004-2009*. (Policy memorandum on finance and the budget for 2004-2009)
- Wheelan, S. (1999, 23/06/1999). British Steel and Hoogovens merge. *World Socialist Web Site*.
- Wiegman, B. W., & Louw, E. (2011). Changing port-city relations at Amsterdam: A new phase at the interface? *Journal of Transport Geography*, 19(4), 575-583. doi:<http://dx.doi.org/10.1016/j.jtrangeo.2010.06.007>
- Yeung, H. W.-c. (2000). Organizing 'the firm' in industrial geography I: networks, institutions and regional development. *Progress in Human Geography*, 24(2), 301-315. doi:10.1191/030913200671984115